

REMARKS

Claims 13, 16-23, 25, 26, 29-35 and 37-43 are currently pending in this application. Claims 13, 16 and 23 have been amended. No new matter has been added to this application.

Rejection of Claims 13, 16-23, 25, 26, 29-35 and 37-43 under 35 U.S.C. § 112

The Examiner has rejected claims 13, 16-23, 25, 26, 29-35 and 37-43 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully traverse the rejection.

The Examiner contends that claims 13, 16, and 23 are indefinite because the Examiner alleges that the step of “the user moving the real instrument in response to viewing the displayed at least one graphic path guide on a display overlaid onto a view that contains said real instrument and a real object, which includes said target” is missing from the claims. Applicants have amended claims 13, 16 and 23 to include this missing limitation. Claims 17-22, 25, 26, 29-35 and 37-43 being dependent upon independent claims 16 and 23 are believed to be definite. Applicants respectfully submit that claims 13, 16 and 23, as amended, correct any prior indefiniteness and request that the rejection of the claims under 35 U.S.C. § 112, second paragraph be withdrawn.

Rejection of Claims 13, 16-23, 25, 26, 29-35 and 37-43 under 35 U.S.C. § 112

The Examiner has rejected claims 13, 16-23, 25, 26, 29-35 and 37-43 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner contends that the claims fail to claim the user moving the real instrument and thus cover an automated control means for moving the real instrument which is not described in the specification. Applicants respectfully traverse the rejection.

Applicants have amended independent claims 13, 16 and 23 to recite that the real instrument is moved by the user thereby negating the enablement

rejection. Claims 17-22, 25, 26, 29-35 and 37-43 being dependent upon independent claims 16 and 23 are also properly supported by the specification. Applicants respectfully submit that claims 13, 16 and 23, as amended are properly supported by the specification and request that the rejection of the claims under 35 U.S.C. § 112, first paragraph be withdrawn.

Double Patenting Rejection

The Examiner has alleged that claims 13, 16-23, 25, 26, 29-35 and 37-43 of the present application conflict with claims 1, 13, and 25 of patent application serial no. 09/818,388. Applicants respectfully traverse the rejection. The claims of the present invention are directed to a virtual guide for aligning an instrument with a target using line-of sight. A virtual guide is augmented onto a scene of an actual target and used to determine a path to a point on the actual target. The actual instrument is then aligned to the actual path by aligning the it to the augmented reality line of sight to a graphical target point.

Applicants submit that this is very different and does not conflict with claims 1, 13 and 25 of application no. 09/888,388 ('388 application). The '388 application is also directed to a method for positioning an instrument but uses a different method. The '388 application uses a graphics guide that has transparent sections along the length of the guide. An instrument is aligned within a path when sections of the instrument can be seen through the transparent sections of the graphics guide. The '388 application does not claim a line-of-sight approach to instrument positioning and therefore Applicants' respectfully submit that there is no double patenting. Applicants request that the double patenting rejection be withdrawn.

Rejection of Claims 13, 16-20, 23, 25, 26, 29, 30, 35, 37, 39, 40, 41, 42 and 43 under 35 U.S.C. § 102(b)

The Examiner has rejected claims 13, 16-20, 23, 25, 26, 30, 35, 37, 39, 40, 41, 42 and 43 under 35 U.S.C. § 102(b) as being anticipated by Applicants' admission of prior art. The Examiner contends that Applicants discuss the use of several types of graphical markers in the augmented reality display to allow a user to align the actual instrument with the path needed to be taken to place the instrument onto the actual target. Applicants respectfully submit that the Examiner's characterization of the prior art disclosed by Applicants is factually incorrect.

Applicants disclose the known use of a bulls eye alignment method in fluoro-guided medical procedures (i.e., X-ray procedures) in which X-rays are used to check the alignment between an instrument and target. While this procedure is effective, the exposure of a patient and physician to excessive radiation is not desirable. Applicants' invention is a solution to the use of X-rays for instruments positioning. Applicants' invention is directed to the use of virtual graphical markers or "virtual X-ray vision" as referred to by Applicant on page 35, lines 20-26.

Contrary to the Examiner's contention that the prior art is disclosed by Applicants on pages 34-36, Applicants disclose the prior art fluoro method and compare it to the augmented reality method of the present invention. Applicants do not disclose or suggest a prior art method for instrument positioning using augmented reality. As such, Applicants respectfully submit that the prior art cited by Applicants does not teach or disclose Applicants' invention as claimed and request that the rejection of claims 13, 16-20, 23, 25, 26, 30, 35, 37, 39, 40, 41, 42 and 43 under 35 U.S.C. § 102(b) be withdrawn.

Rejection of Claims 16, 22, 23, 31-35, 37 and 40-42 under 35 U.S.C. § 102(b)

The Examiner has rejected claims 16, 22, 23, 31-35, 37 and 40-42 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication No.

2002/077540 (Kienzle). The Examiner contends that Kienzle discloses Applicants' invention as claimed. Applicants respectfully traverse the rejection.

The present invention is directed to a method for augmented reality guided instrument positioning. A point is defined on an actual target. An actual path to reach the point on the actual target is defined. A graphical representation of the actual target point and the actual path in the form of a graphical target point and at least one graphical axis marker is rendered on a display overlaid onto a view that contains the real instrument and a real object, which includes the target, respectively. The graphical representation is rendered with respect to a user's augmented reality viewpoint such that the augmented reality view combines a view of an actual scene with the graphical representation and the augmented reality line of sight to the graphical target point coincides with the actual path that the actual instrument needs to be aligned to during a positioning of the actual instrument to the actual target point. The actual instrument is aligned to the actual path by aligning it to the augmented reality line of sight towards the graphical target point. The actual instrument is moved by a user in response to viewing the rendered graphical representation on a display overlaid onto a view that contains the real instrument and a real object, which includes the target along the actual path towards the actual target point while keeping it aligned with the augmented reality line of sight.

Kienzle discloses a computer assisted surgery system which uses graphic representations that are displayed overlaid onto X-ray images. Kienzle discloses a standard navigation system in which the location of the tracked instrument is superimposed as a virtual model onto a medical image. Correct alignment is achieved by looking at the position of the instrument's virtual model in the medical image. In Kienzle, using a tracking system to track the position of the actual instrument is an essential part of the navigation process.

In the present invention there is no need to track the actual instrument. A user sees a real view of the real instrument and a real patient. These real

images are augmented with medical images that allow the user to perceive the internal anatomy of the patient. Correct alignment is performed by looking at the augmented reality image and the position of the real instrument in the context of the internal anatomical structures. Applicants respectfully submit that Kienzle does not teach using augmented reality for guided instrument positioning. Kienzle merely teaches using a virtual feature to identify landmark points in the body of a patient. As such, Kienzle does not teach or disclose Applicants' invention as claimed. Applicants respectfully request that the rejection of claims 16, 22, 23, 31-35, 37 and 40-42 under 35 U.S.C. § 102(b) be withdrawn.

Rejection of Claim 21 under 35 U.S.C. § 103(a)

The Examiner has rejected claim 21 under 35 U.S.C. § 103(a) as being unpatentable over Kienzle in view of Applicants' admitted prior art. The Examiner correctly notes that Kienzle does not teach or disclose a graphical axis marker that comprises an intersection of at least two lines that is centered on the axis of the actual instrument for correct alignment. The Examiner contends that Applicants' admitted prior art teaches uses gun aiming and argues that it would have been obvious to one skilled in the art to apply it to augmented reality aiming of real instruments. Applicants respectfully traverse the rejection.

Applicants respectfully submit that the combination of Kienzle and the prior art cited by Applicants does not teach or disclose Applicants' invention as claimed. Neither Kienzle nor the prior art teach or disclose an augmented reality method for positioning an instrument in which the step of "aligning the actual instrument to the actual path by aligning it to the augmented reality line of sight towards the graphical target point, and moving the actual instrument by a user in response to viewing the rendered graphical representation on a display overlaid onto a view that contains said real instrument and a real object, which includes said target along the actual path towards the actual target point while keeping it aligned with the augmented reality line of sight" as recited in amended

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independent claim 16. Claim 21 being dependent upon independent claim 16 is also not taught or disclosed by the combination of Kienzle and the prior art. Applicants respectfully request that the rejection of claim 21 under 35 U.S.C. § 103(a) be withdrawn.

Conclusion

Applicants respectfully submit that claims 13, 16-23, 25, 26, 29-35 and 37-43, as amended, are in condition for allowance and request that a timely Notice of Allowance be issued in this case. The Examiner is invited to contact the undersigned should he have any questions in this matter.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michele L. Conover". The signature is fluid and cursive, with the first name "Michele" being more prominent than the last name "Conover".

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